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GAMMA RAYS from TYPE Ia SUPERNOVA SN 2014J

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Abstract

© 2015. The American Astronomical Society. All rights reserved.. The whole set of INTEGRAL observations of Type Ia supernova SN 2014J, covering the period 19-162 days after the explosion, has been analyzed. For spectral fitting the data are split into early and late periods covering days 19-35 and 50-162, respectively, optimized for 56Ni and 56Co lines. As expected for the early period, much of the gamma-ray signal is confined to energies below ~200 keV, while for the late period it is strongest above 400 keV. In particular, in the late period, 56Co lines at 847 and 1248 keV are detected at 4.7σ and 4.3σ, respectively. The light curves in several representative energy bands are calculated for the entire period. The resulting spectra and light curves are compared with a subset of models. We confirm our previous finding that the gamma-ray data are broadly consistent with the expectations for canonical one-dimensional models, such as delayed detonation or deflagration models for a near-Chandrasekhar mass white dwarf. Late optical spectra (day 136 after the explosion) show rather symmetric Co and Fe line profiles, suggesting that, unless the viewing angle is special, the distribution of radioactive elements is symmetric in the ejecta.

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Keywords

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